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A SIMPLIFIED (BUDGETED) METHOD FOR MEASURING THE STATUS OF A ROAD'S SURFACE IN REAL TIME USING COMPUTE AND 3D SCANNING TECHNOLOGY

HP INC

A Simplified (Budgeted) Method for Measuring the Status of a Road's Surface in Real Time Using Compute and 3D Scanning Technology

The method described here uses a three-dimensional (3D) scanning system in combination with software and a vehicle attachment to analyze road surfaces.

Issue Resolved:

- Cities are required to maintain roads
- Road surfaces can be repaired too soon or too late requiring more expensive repairs or waste of funds
- Subjective or fixed scheduling can result in biased results or waste of funds
- Laser or lidar-based systems may be excessively expensive

Resolution:

Scanning and scoring of a road surface produces an objective value associated with the condition of the road. This provides the opportunity for a more objective comparison. By removing subjective personal bias, judgments or resident social connections from the decision-making process, a fairer distribution of repairs is possible. Current systems can be very expensive and may not be economically accessibility for municipal governments.

3D scanning using a projector/camera-based system can produce useable results at an achievable economic price point. Additionally, it can generate useable secondary data that may be economically beneficial (photos of road surfaces, markings, damage to markings, etc.)

which may be saleable in a secondary market. And finally, scanning produces an objective and fair means of determining the current integrity of a road.

Implementation:

- Vehicle attachment which mounts a 3D scanning system off the front or rear
- 3D scanning system can project shifting shapes onto the road surfaces based on current conditions and surface type
- Environmental conditions are recorded (date, time, ambient light, shapes used, distance to the ground, speed of the vehicle, GPS, etc.)
- One or more cameras capture the images projected onto the surface
- 3D scanning software analyzes the distortions in the projected shapes to produce a depth or damage map
- The map can be compressed into composite scores based on configurable criteria: street, area, size, type of damage
- Video or pictures of surfaces of road surfaces can be stored for reuse in research, determination of type of damage, determination of source of damage, determination of quality of repair, surface marking condition, etc.
- Use of an objective criteria removes subjective or judgement based biases from the decision making process.

Refer to Diagram 1 for a detail process flow of the disclosure. Additionally, refer to Diagram 2 for a schematic representation of an example scanning rig.

Diagram 1: Execution Flow

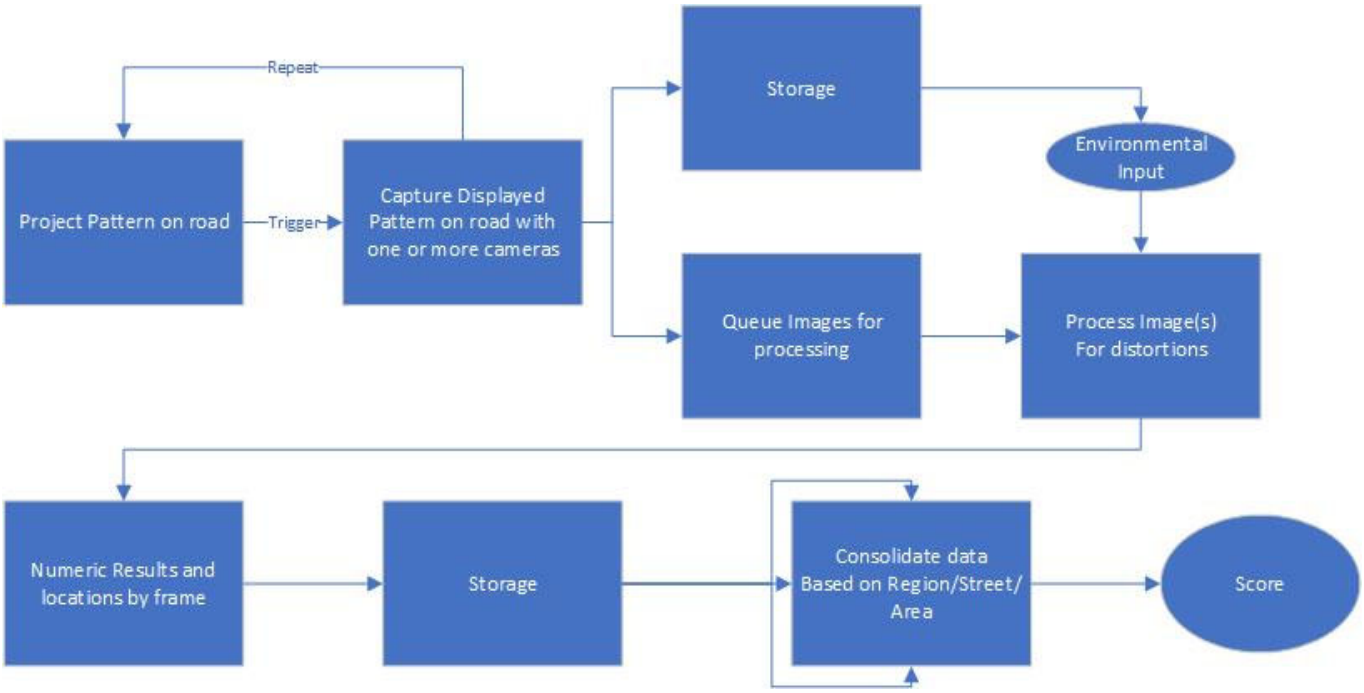
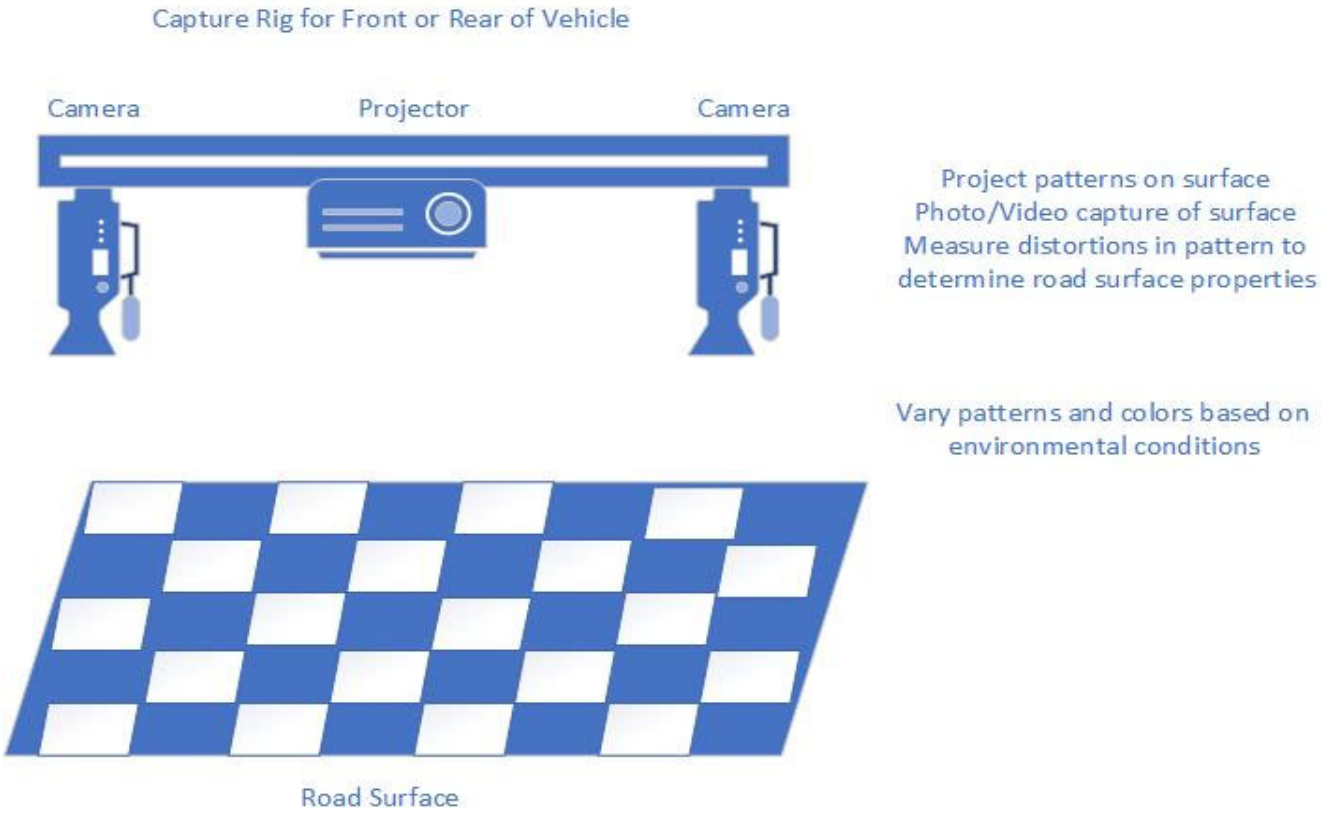


Diagram 2: Scanning Rig



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